MSK MRI Protocol Standardization:
Impact on patient care and finances across a large health care system

Manickam Kumaravel, M.D.
Thomas Connors, B.B.A.
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Purpose

To evaluate the impact of MRI protocol standardization on:

• Patient experience
• Throughput
• Financial implications for a large healthcare system
Materials and Methods

- Outpatient imaging centers have a duty to provide efficient, patient centered care
- MRI studies are time intense complex outpatient examinations
- Magnet time is a determinant of patient comfort which directly results in patient compliance
Materials and Methods

Multiple protocols for the same MRI examination across various imaging centers in the same large healthcare system produce:

- Inconsistent quality of the examination
- Inconsistent patient experience
- Variable MRI table time and overall turnover time
- Discontentment from referring clinicians who receive variable quality images due to the varied protocols
Materials and Methods

Background of imaging in a large city:
• Large healthcare system with multiple outpatient imaging centers
• Geographically centers are spread apart over City is 600 sq. miles
• 3 Radiology groups with subspecialists providing interpretations
• Many centers had variable protocols for routine musculoskeletal (MSK) MRI studies
Materials and Methods - Standardization

- Standardization was achieved by circulating protocols through an online interactive drive between three groups of radiologists providing imaging services as part of the larger healthcare system.

- Each subspecialty physician received access to the protocols and was able to provide feedback until consensus on protocol design was achieved.
Materials and Methods

• Shoulder MRIs are one of the most common examinations performed at outpatient imaging centers

• The pre-standardization and post-standardization timings of shoulder MRI studies were analyzed from 6 imaging centers, a representative sample of the three radiology groups’ service domains
Results

- Protocol standardization reduced the number of sequences from an average of 6 to an average of 4

- Pre-standardization (FY2014) and post-standardization (FY2015) data was extracted and analyzed including:
  - Total number of sequences
  - Total study time
Results

New Protocol Time Savings

- Imaging Center #1: 8.6% Reduction
- Imaging Center #2: 25.0% Reduction
- Imaging Center #3: 11.6% Reduction
- Imaging Center #4: 22.3% Reduction
- Imaging Center #5: 14.2% Reduction
- Imaging Center #6: 16.6% Reduction
- System Wide Average: 16.5% Reduction

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Results

• Findings show a scan time reduction of 16.5% per study

• These time savings per study increase capacity to add 3.5 additional studies per day

• CPT code billed non-contrast shoulder MRI is $3,805
  • Assuming a collection rate of 33%, this translates into $1,256 of revenue per additional study
Results

• The additional capacity due to protocol standardization results in significant projected revenue increases
  
  • Additional projected net revenue per center of $1,331,423
  
  • System wide outpatient center projected net revenue increase of $27,959,877, representing an increase of 15.94%
Results

**Annual Net Revenue Per Cener**
- 2014: $8,353,949
- 2015: $9,685,372

**Systemwide Annual Net Revenue**
- 2014: $175,432,933
- 2015: $203,392,810
Discussion

- MRI magnet operation is associated with high levels of fixed costs including cost of the machine, maintenance, technician labor costs, and standby operational costs.

- The standardization of imaging protocols increases the efficiency of magnet utilization time and creates the capacity to perform up to 3.5 additional musculoskeletal studies per day per magnet.
Discussion

• These additional studies have a high contribution margin given the low variable cost component of each additional study.

• Given the high contribution margin, the additional revenues generated from these additional studies flow through the income statement of the imaging center and significantly increase net income.
Conclusion

• Standardizing protocols improves patient comfort and reduces magnet time with increased clinical satisfaction

• Time savings translate into increases in revenue per magnet with major implications for revenue growth across a large healthcare system with multiple imaging centers

• Given the large component of fixed costs associated with operating an MRI magnet, the majority of increased revenue from the additional scans drops down to net income.
Recommendations

- System administrative support for protocol streamlining
- Review of protocols at routine intervals (every 6 months to 12 months) to establish appropriate performance of studies
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References

